Amendments to the Specification:

Paragraph beginning on page 3, line 22

In networks with sufficient redundancy within each color (i.e. in each sub-network built of a single color there is ~~enough~~ sufficient redundancy ~~such~~ that a protection path can be found for each link), the mechanism is operative to determine the protection path by eliminating all colors from the logical topology of the network except for the color corresponding to the link to be protected. This ~~serves to guarantee~~ guarantees that the protection path calculated will not traverse the same physical fiber as the link to be protected. Thus, the invention does not require or rely on the physical topology of the network. This is useful in WDM networks where the physical topology is typically not known.

Paragraph beginning on page 4, line 15

The mechanism of the present invention is well suited for ~~implemented~~ implementation using software. In one example application, the mechanism is implemented in software on [[a]] an NMS connected to the network. The NMS comprises a computer comprising a processor, memory, etc. operative to execute software adapted to perform the link based network protection path calculation mechanism of the present invention.

Paragraph beginning on page 10, line 25

The present invention provides a link based network protection route calculation mechanism. The mechanism is particularly useful in optical networks employing wave division multiplexing or dense wave division multiplexing but is also applicable to other types of networks as well. In addition, the invention is applicable to networks having any topology such as mesh or ring network topologies. Further, the invention is not limited to the type of signaling used or the routing algorithm used to calculate the protection routes.

_____For illustration purposes, the principles of the present invention are described in the context of an optical network employing WDM techniques. Further, the mechanism of the present invention is shown implemented in a Network Management System in communication with the network. It is not intended, however, that the invention be limited to the configurations and embodiments described herein. It is appreciated that one skilled in the electrical and/or networking arts may apply the principles of the present invention to numerous other types of networking devices and network configurations as well without departing from the spirit and scope of the invention.

Paragraph beginning on page 11, line 6

Two embodiments of the invention are presented. In the first embodiment, no virtual colors are assigned and the actual existing colors are used. This embodiment is applicable in single fiber networks using pure WDM or DWDM that have sufficient redundancy within each color to create protection paths. In the second embodiment, virtual colors are assigned. This embodiment is applicable in either networks employing optical fiber bundles or in ~~network~~ networks that do not initially have sufficient redundancy within each color to create protection paths.

Paragraph beginning on page 12, line 19

Initially, in the event of a link failure such as an optical fiber cut, etc., the software in each node does not get involved. At first, the hardware detects a loss of signal on the link and the network processor or other equivalent processing element switches the traffic from the failed link to a previously calculated protection route (or restoration route). In the case of MPLS based networks, the protection route comprises [[a]] an LSP tunnel. For each link to be protected, a restoration route is calculated a priori (i.e. off line) and the appropriate nodes are configured in accordance with the restoration route.

The protection route may be calculated using any suitable search algorithm such as the well known Dijkstra routing algorithm, Breadth Search First (BSF) or Depth Search First (DFS), for example, or any other search algorithm capable of calculating a protection route based on the logical topology of the network. Note that the logical topology is the topology of the links in the network whereas the physical topology is the topology of the fibers in the network.

Paragraph beginning on page 13, line 5

The invention achieves this by modifying the link level topology of the network used by the search algorithm. In accordance with the invention, the search for a protection route for any particular link is restricted to the set of logical links that use the same color as that of the link to be protected. Since the same color is not used twice in any one fiber[[ ]], this ~~insures~~ guarantees that the protection route will not pass through the failed link.

Paragraph beginning on page 13, line 17

The first step is to determine the color of the link to be protected (step 90). It is also assumed the logical topology of the network is known by the entity performing the search algorithm, e.g., the NMS, designated node or other equivalent entity. In general, details of the physical topology [[is]] are not ~~needed~~ required by the invention. Its only use is by the network designer when building the network, in determining whether there is sufficient redundancy within each color for each of the

required protection routes to be created, such that in the event of a single fiber failure, the protection paths of all failed links do not use the same bandwidth.

Paragraph beginning on page 15, line 16

A flow diagram illustrating the method of assigning virtual colors in networks without sufficient redundancy within each color is shown in Figure 6. In order to assign virtual colors to one or more links in the network, the physical network topology must be known to the operator (step 50) and the logical topology must be known to the operator (step 52). As described supra, the physical topology is not needed by the invention. The user assigns logical colors to logical-links such that the same color does not pass twice through the same fiber and such that there is enough redundancy within each color to ~~calculated~~ calculate the protection path (step 54). It is then verified that the virtual colors assigned do not traverse any existing same colored paths (step 56).

Paragraph beginning on page 15, line 25

After virtual colors are assigned in the network, there should be sufficient redundancy for protection routes, assuming the network operator properly assigned virtual colors. For each link to be protected, the route calculation mechanism of Figure 3 is executed to determine [[the]] a protection route. Thus, the assignment of virtual colors to links enable the links to be included in the execution of the search algorithm for finding protection paths that do not traverse the protected link.

Paragraph beginning on page 16, line 14

A flow diagram illustrating the method of assigning virtual colors to bundles of fibers is shown in Figure 8. In order to assign virtual colors to links in the network, the location of the fiber bundles must be known (step 50) and the logical topology must be known (step 52). As described supra, the physical topology is not needed by the invention. It is used for the manual color assignment process, in which the user assigns logical colors to logical-links such that the same color does not pass twice through the same fiber bundle (step 54), such that ~~enough~~ sufficient redundancy exists within each color ~~such~~ so that protection paths can be found for each link using only links of the same color.